WHAT IS CLAIMED IS:

1. An optical transmission system comprising a transmitting-end optical transmission device, a receiving-end optical transmission device and an optical transmission line connecting the transmitting-end and receiving-end optical transmission devices,

the transmitting-end optical transmission device comprising:

encoding means having n outputs, for forming k data by aligning phases of data on k channels with each other and for generating (n-k) error correction bits for said k data and adding said (n-k) error correction bits to said k data; and

wavelength-multiplexing means connected to the encoding means, for converting both said k data and said (n-k) error correction bits to n optical signals having different wavelengths and for wavelength-multiplexing said n optical signals so as to be delivered to the optical transmission line, and

the receiving-end optical transmission device comprising:

wavelength-demultiplexing means for separating the wavelength-multiplexed optical signals from the optical transmission line into n optical signals, each corresponding to one of the different wavelengths; and

decoding means connected to the wavelength-multiplexing means, for generating k error corrected data by correcting error bits using the (n-k) error correction bits contained in said n separated optical signals.

2. An optical transmission system comprising a transmitting-end optical transmission device, a receiving-end optical transmission device and an optical transmission line connecting the transmitting-end and receiving-end optical transmission devices,

the transmitting-end optical transmission device comprising:

parity generating means for forming k data by adding an SOH (Section Over Head) including at least one error monitoring byte to data on k channels and aligning phases of said data with each other and for generating a parity bit for said k data and adding said parity bit to said k data; and

wavelength-multiplexing means connected to the parity generating means, for converting said k data and said parity bit to (k+1) optical signals having different wavelengths and for wavelength-multiplexing said (k+1) optical signals so as to be delivered to the optical transmission line, and

the receiving-end optical transmission device comprising:

wavelength-demultiplexing means for separating the wavelength-multiplexed optical signals from the optical transmission line into (k+1) optical signals, each corresponding to one of the different wavelengths; and

error correction means connected to the wavelength-multiplexing means, for correcting error bits based on one result of a parity check for said separated (k+1) optical signals and the other result of a parity check using said at least one error monitoring byte.

3. An optical transmission system comprising a transmitting-end optical transmission device, a receiving-end optical transmission device and an optical transmission line connecting the transmitting-end and receiving-end optical transmission devices,

the transmitting-end optical transmission device comprising:

encoding means having k input and n outputs, for generating (n-k) error correction bits for every transmission data having k bits; and

wavelength-multiplexing means connected to the encoding means, for converting said transmission data and said (n-k) error correction bits to n optical signals having different wavelengths and for wavelength-multiplexing said n optical signals so as to be delivered to the optical transmission line, and

the receiving-end optical transmission device comprising:

wavelength-demultiplexing means for separating the wavelength-multiplexed optical signals from the optical transmission line into n optical signals, each corresponding to one of the different wavelengths; and

decoding means connected to the wavelength-multiplexing means, for correcting error bits of data having k bits contained in said n separated optical signals by using said (n-k) error correction bits contained in said n separated optical signals.

4. An optical transmission system comprising

a transmitting-end optical transmission device, a receiving-end optical transmission device and an optical transmission line connecting the transmitting-end and receiving-end optical transmission devices,

the transmitting-end optical transmission device comprising:

encoding means having k input and n output, for generating (n-k) error correction bits for transmission data on k channels and adding the (n-k) error correction bits to the transmission data so as to form a sequence of n data;

multiplexing and frame generating means connected to the encoding means, for adding a frame synchronization information to each data in the sequence of the n data and time-division-multiplexing the n data; and

electrical-optical converting means connected to the multiplexing and frame generating means, for converting the time-division-multiplexed n data into n optical signals so as to deliver the n optical signals to the optical transmission line, and

the receiving-end optical transmission device comprising:

optical-electrical converting means for converting the n optical signals via the optical transmission line to electrical signals;

separating means connected to the optical-electrical converting means, for separating the electrical signals into a sequence of n data by detecting the frame synchronization information; and

decoding means connected to the separating means, for performing error correction decoding for a sequence of k data from said separated sequence of the n data using a sequence of (n-k) data from said separated sequence of the n data.

5. An optical transmission device comprising:

encoding means having k inputs, for forming n data by generating (n-k) error correction bits for k data corresponding to k channels and adding the (n-k) error correction bits to the k data;

phase alignment means for aligning phases of the n data received from the encoding means;

electrical-optical converting means for converting the n data aligned in phase by the phase alignment means to n optical signals having different wavelengths; and

wavelength-multiplexing means for multiplexing the n optical signals having the different wavelengths received from the electrical-optical converting means so as to form wavelength-multiplexed signals.

6. An optical transmission device comprising:

wavelength-demultiplexing means for separating wavelength-multiplexed optical signals having n wavelengths into n optical signals corresponding to the n wavelengths;

optical-electrical converting means connected to the wavelength-demultiplexing means, for receiving and converting the separated n optical signals corresponding to the n wavelengths into n electrical signals; and

decoding means for performing an error correction decoding for k data contained in the n

electrical signals converted by the optical-electrical converting means using (n-k) error correction bits contained in said n electrical signals.

7. An optical transmission device comprising:

frame generating and SOH inserting means for adding an SOH (Section Over Head) to data for each of k channels such that all the k data can be aligned in phase by means of a frame synchronization byte within each SOH;

encoding means having n outputs and connected to the frame generating and SOH inserting means, for receiving the k data with the SOH, generating (n-k) error correction bits for the k data without taking the frame synchronization bytes into account, adding a frame synchronization byte to each of the (n-k) error correction bits and forming n data, each of the n data including its frame synchronization byte, by combining the (n-k) error correction bits and the k data corresponding to the k channels;

electrical-optical means for converting the n data from the encoding means into n optical signals having different wavelengths; and

wavelength-multiplexing means connected to the electrical-optical converting means, for multiplexing the n optical signals from the electrical-optical converting means so as to form wavelength-multiplexed signals.

8. An optical transmission device comprising:

wavelength-demultiplexing means for separating wavelength-multiplexed optical signals having n wavelengths into n optical signals corresponding to the n wavelengths;

optical-electrical converting means connected to the wavelength-demultiplexing means, for receiving and converting the separated n optical signals corresponding to the n wavelengths into n electrical signals;

frame top detecting means for detecting a top of a frame for each of the n electrical signals converted by the optical-electrical converting means;

memory means for storing the n electrical signals converted by the optical-electrical converting means and outputting the stored n electrical signals such that the tops of the frames detected by the frame top detecting means are aligned with each other;

decoding means for performing an error correction decoding for k data contained in the n electrical signals converted by the optical-electrical converting means using (n-k) error correction bits contained in said n electrical signals; and

SOH (Section Over Head) terminating means for receiving the k data from the decoding means and terminating an SOH for said every k data.

9. An optical transmission device comprising:

SOH inserting means for adding an SOH (Section Over Head) including an error monitoring byte

to data for each of k channels;

parity generating means for receiving the data for each of the k channels from the SOH inserting means, calculating and adding a parity to the data so as to generate (k+1) data;

phase alignment means for aligning phases of the (k+1) data received from the parity generating means;

electrical-optical converting means for converting the (k+1) data whose phases are aligned by the phase alignment means to (k+1) optical signals having different phases; and

wavelength-multiplexing means for multiplexing the (k+1) optical signals from the electrical-optical converting means so as to form wavelength-multiplexed signals.

10. An optical transmission device comprising:

wavelength-demultiplexing means for separating (k+1) multiplexed optical signals into (k+1) optical signals having (k+1) wavelengths, respectively;

optical-electrical converting means for receiving the separated (k+1) optical signals from the wavelength-demultiplexing means and converting said (k+1) optical signals into (k+1) electrical signals;

parity detection means for receiving the (k+1) electrical signals received from the optical-electrical converting means and locating a bit position of an error bit by checking a parity contained in said received (k+1) electrical signals and by performing parity check for each data of the k electrical signals corresponding to k channels using

at least one error monitoring byte attached to said k electrical signals; and

error correction means for performing an error correction at the bit position of the error bit located by the parity detection means.

11. An optical transmission device comprising:

encoding means having k inputs and n outputs, for generating (n-k) error correction bits for every k bits of transmission data;

phase alignment means for aligning both tops of the transmission data having the k bits and the (n-k) error correction bits in phase;

electrical-optical converting means for converting the transmission data and the error correction bits aligned in phase with one another by the phase alignment means to optical signals having different wavelengths;

wavelength-multiplexing means for receiving from the electrical-optical means and multiplexing the optical signals having the different wavelengths.

12. An optical transmission device comprising:

wavelength-demultiplexing means for separating wavelength-multiplexed optical signals into n optical signals having different wavelengths;

optical-electrical converting means for converting the n optical signals having the different wavelengths to n electrical signals including k bits

representing transmission data;

decoding means receiving the n electrical signals from the optical-electrical converting means, for performing error correction decoding for every said k bits using (n-k) bits representing error correction bits.

13. An optical transmission device comprising:

encoding means having k input and n output, for generating (n-k) error correction bits for transmission data on k channels and adding the (n-k) error correction bits to the transmission data so as to form a sequence of n data;

multiplexing and frame generating means connected to the encoding means, for adding a frame synchronization information to each data in the sequence of the n data and time-division-multiplexing the n data; and

electrical-optical converting means connected to the multiplexing and frame generating means, for converting the time-division-multiplexed n data into n optical signals so as to deliver the n optical signals to an optical transmission line.

14. An optical transmission device comprising:

optical-electrical converting means for converting time-division-multiplexed signals to electrical signals;

separating means connected to the

optical-electrical converting means, for separating the electrical signals into a sequence of n data including k bits representing transmission data and (n-k) bits representing error correction bits by detecting a frame synchronization information; and

decoding means connected to the separating means, for performing error correction decoding for every said k bits using said (n-k) error correction bits.

15. An optical transmission device having n channels comprising:

encoding means for generating error correction bits for m data corresponding to any m channels of k channels representing transmission data, k being less than n and a number of the error correction bits being (n-k);

identification signal inserting means connected to the encoding means, for inserting an identification signal into each of the m data and the (n-k) error correction bits from the encoding means;

multiplexing means connected to the identification signal inserting means, for time-division-multiplexing (k-m) data rather than said m data in the transmission data, and, said m data as well as said (n-k) error correction bits; and

electrical-optical converting means for receiving from the multiplexing means and converting the time-division-multiplexed signals to optical signals.

16. An optical transmission device having n channels comprising:

optical-electrical converting means for converting time-division-multiplexed signals including k data representing transmission data for k channels in the n channels and (n-k) error correction bits to n electrical signals;

separating means for separating the n electrical signals receiving from the optical-electrical converting means into a sequence of n data;

identification signal detecting means for detecting m data and the (n-k) error correction bits in the sequence of the n data received from the separating means, each of the m data and the (n-k) error correction bits having an identification signal; and

decoding means receiving the k data and the (n-k) error correction bits from the identification signal detecting means, for performing error correction decoding on the m data using the (n-k) error correction bits.

17. An optical transmission device having n channels comprising:

encoding means receiving m data corresponding to any m channels of k channels representing transmission data and (k-m) fixed data, for generating (n-k) error correction, k being less than n;

identification signal inserting means connected to the encoding means, for inserting an identification signal into each of the m data and the (n-k) error correction bits;

multiplexing means connected to the identification signal inserting means, for time-

division-multiplexing (k-m) data rather than said m data in the transmission data, and, said m data as well as said (n-k) error correction bits; and

electrical-optical converting means for receiving from the multiplexing means and converting the time-division-multiplexed signals to optical signals.

18. An optical transmission device having n channels comprising:

optical-electrical converting means for converting time-division-multiplexed signals including k data representing transmission data for k channels in the n channels and (n-k) error correction bits to n electrical signals;

separating means for separating the n electrical signals receiving from the optical-electrical converting means into a sequence of n data;

identification signal detecting means for detecting m data and the (n-k) error correction bits in the sequence of the n data received from the separating means, each of the m data and the (n-k) error correction bits having an identification signal; and

decoding means receiving the m data as well as the (n-k) error correction bits from the identification signal detecting means and (k-m) fixed data, for performing error correction decoding on the m data using the (n-k) error correction bits.

19. An optical transmission device comprising:

frame generating and SOH inserting means for adding an SOH (Section Over Head) to data for each of k channels such that all the k data can be aligned in phase by means of a frame synchronization byte within each SOH;

encoding means having n outputs and connected to the frame generating and SOH inserting means, for receiving the k data with the SOH, generating (n-k) error correction bits for the k data without taking the frame synchronization bytes into account, adding a frame synchronization byte to each of the (n-k) error correction bits and forming n data, each of the n data including its frame synchronization byte, by combining the (n-k) error correction bits and the k data corresponding to the k channels; and

electrical-optical converting means for converting the n data from the encoding means into n optical signals having different wavelengths.

20. An optical transmission device comprising:

optical-electrical converting means for converting n optical signals corresponding to n wavelengths into n electrical signals;

frame top detecting means for detecting a top of a frame for each of the n electrical signals converted by the optical-electrical converting means;

memory means for storing the n electrical signals converted by the optical-electrical converting means and outputting the stored n electrical signals such that the tops of the frames detected by the frame top detecting means are aligned with each other;

decoding means for performing an error

correction decoding for k data contained in the n electrical signals converted by the optical-electrical converting means using (n-k) error correction bits contained in said n electrical signals; and

SOH (Section Over Head) terminating means for receiving the k data from the decoding means and terminating an SOH for said every k data.